


Functional connectivity analysis

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 An abbreviated version of this protocol was published in eLIFE in Aug 2016

Uniting functional network topology and oscillations in the fronto-parietal single unit network of behaving primates

DOI: 10.7554/eLife.15719

Detailed protocol

Dear Qifan Wang,

I am the first author of the paper “Uniting functional network topology and oscillations in the fronto-parietal single unit network of behaving primates” in eLife 2016

First of all, thanks for your interest in our work.

Regarding your scientific question about the calculation of surrogate CCHs:

Back then when I started the project, I actually encountered the same problem as you did. However, my entire code is written in Matlab and therefore my solution may not be easily translatable to Python.

Nonetheless, here a complete list of how I solved the "calculation time problem":

1. I indeed used parallel computation on three computers in parallel (quad core, 32GB Ram)
2. I wrote my own function to compute CCHs. Instead of using the standard fft based function to compute CCHs, I computed CCHs based on the spike-triggered average, which is possible for point processes and up to about 100x faster depending on the firing rate.
3. Matlab is a programming language optimized for logical indexing. By using logical indexing, I managed to generate an entire surrogate spiking activity set in less than a minute, and further reduced the calculation time of CCHs.
4. I wrote floating point files of intermediate calculation steps directly to disc and streamed the required parts for the next calculation step.

I hope my answer provides you with possible solutions or at least approaches, how you can solve the calculation time problem in Python.

Best regards,

Benjamin Dann

How to cite: (Readers should cite both the Bio-protocol preprint and the original research article where this protocol was used)

1. Dann, B. (2020). Functional connectivity analysis. Bio-protocol Preprint. bio-protocol.org/prep387.
2. Dann, B., Michaels, J. A., Schaffelhofer, S. and Scherberger, H. (2016). Uniting functional network topology and oscillations in the fronto-parietal single unit network of behaving primates. eLIFE. DOI: [10.7554/eLife.15719](https://doi.org/10.7554/eLife.15719)

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